RESEARCH PROGRESS

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1. **Analysis Status**
   Signal MC production

2. **Work Plan in Progress**
   Ideas on Reconstruction efficiency extraction

Signal MC production

- 8 Monte Carlo samples of 10000 events each produced by evtgen+gsim
  $e^+e^- \to c\bar{c} \to (D^{*+}/D^{*-}), \, inclusive$
  $D^{*+} \, and \, D^{*-}$ each decay into 4 modes ,8 separate samples
  $D^{*\pm}$ forced into $(K^0_L/K^0_S)\pi^0 \, and \, (K^0_L/K^0_S)\pi\pi \, final \, states$
  Samples saved at:
  /h13/subdetectors/klm/manmohan/dstar/sigMC/

Ideas behind extracting reconstruction efficiency

- $A = \frac{N^{obs}_{K_L\pi} - \epsilon^{K\pi}_{rel} \times N^{obs}_{K_S\pi}}{N^{obs}_{K_L\pi} + \epsilon^{K\pi}_{rel} \times N^{obs}_{K_S\pi}} = \frac{N^{obs}_{K_L\pi} - (\epsilon^{K\pi}_{rel}/\epsilon^{K\pi\pi}_{rel}) \times \epsilon^{K\pi\pi}_{rel} \times N^{obs}_{K_S\pi}}{N^{obs}_{K_L\pi} + (\epsilon^{K\pi}_{rel}/\epsilon^{K\pi\pi}_{rel}) \times \epsilon^{K\pi\pi}_{rel} \times N^{obs}_{K_S\pi}}$

  Aim is to use $\epsilon^{K\pi\pi}_{rel}$ in place of $\epsilon^{K\pi}_{rel}$

  If $(\epsilon^{K\pi}_{rel}/\epsilon^{K\pi\pi}_{rel})$does not cancel it introduces error

  ϵ^{K_L} depends strongly on $p^{lab}_{K^0}$ so $\epsilon^{K\pi\pi}_{rel}$in bins of $p^{lab}_{K^0}$??? why ???

  $[K\pi], [K\pi\pi]$:diffrent $p^{lab}_{K^0}$ spectra, $(\epsilon^{K\pi}_{rel}/\epsilon^{K\pi\pi}_{rel})$ does not cancel

  $fig.1$

- We study $\epsilon^{K\pi\pi}_{rel}$ in bins of $p^{lab}_{K^0}$

  $\epsilon^{K_L\pi} = \int_{[K_L\pi]} \eta_{K_L\pi} \times \epsilon^{K_L}(p^{lab}_{K^0})\, d(p^{lab}_{K^0})$ and

  $\epsilon^{K_S\pi} = \int_{[K_S\pi]} \eta_{K_S\pi} \times \epsilon^{K_S}(p^{lab}_{K^0})\, d(p^{lab}_{K^0})$

  Thus $\frac{d}{dp}(\epsilon^{K_L\pi}) = \eta_{K_L\pi} \times \epsilon^{K_L}(p)$ and $\frac{d}{dp}(\epsilon^{K_S\pi}) = \eta_{K_S\pi} \times \epsilon^{K_S}(p)$

  since $\frac{d}{dp}[\int^p f(x)\, dx] = f(p)$

  Thus $\frac{d\epsilon^{K_L\pi}}{d\epsilon^{K_S\pi}} = (\eta_{K_L\pi}/\eta_{K_S\pi}) \times \epsilon_{rel}(p)$

  Similarly $\frac{d\epsilon^{K_L\pi\pi}}{d\epsilon^{K_S\pi\pi}} = (\eta_{K_L\pi\pi}/\eta_{K_S\pi\pi}) \times \epsilon_{rel}(p)$

  $\frac{d\epsilon^{K_L\pi}}{d\epsilon^{K_S\pi}}, \frac{d\epsilon^{K_L\pi\pi}}{d\epsilon^{K_S\pi\pi}} \equiv$ relative yields in bins of $p^{lab}_{K^0}$ $fig2$

  We measure $N^{obs}_{K_L\pi}, N^{obs}_{K_S\pi}, N^{obs}_{K_L\pi\pi}, N^{obs}_{K_S\pi\pi}$ all in $p^{lab}_{K^0}$ bins

  $A = \frac{N^{obs}_{K_L\pi} - N^{obs}_{K_L\pi\pi}/N^{obs}_{K_S\pi\pi} \times N^{obs}_{K_S\pi}}{N^{obs}_{K_L\pi} + N^{obs}_{K_L\pi\pi}/N^{obs}_{K_S\pi\pi} \times N^{obs}_{K_S\pi}} inbinsof\,\mathrm{p}^{lab}_{K^0}$

figure 1

figure 2